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**APRIL 1959**

# **SOIL CONSERVATION**

Soil Conservation Service • U. S. Department of Agriculture

# SOIL CONSERVATION.

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U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

## ★ THIS MONTH ★

	PAGE
<b>POPLAR FOREST—JEFFERSON'S BEDFORD FARM</b> <i>By Gordon S. Smith</i>	195
<b>PRODUCTIVE PARTNERS—SCDs and FFA Chapters</b> <i>By Claude D. Crowley</i>	197
<b>CONSERVATION FARMER OF HAWAII</b> <i>By Herbert Yanamura and Howard Cooper</i>	200
<b>WATER IS WORTH WHAT IT COSTS</b> <i>By Floyd W. Dorius</i>	201
<b>RANGE IMPROVEMENT IN AUSTRALIA</b>	204
<b>ANTHRAX—A SOIL BORNE DISEASE</b> <i>By G. B. Van Ness</i>	206
<b>SUPPLEMENTS TO CLASSROOM WORK</b> <i>By Robert H. Mills</i>	208
<b>WILDLIFE BENEFIT FROM CONTROLLED BURNING</b> <i>By H. Leo Wilson</i>	210
<b>A DECADE OF SERVICE</b> <i>By W. L. Vaught</i>	211
<b>EARL H. SLY OF SOUTH DAKOTA—A Profile</b> <i>By James P. Hughes</i>	213
<b>OPERATION—POND PLUG</b> <i>By Roger N. Levesque</i>	215
<b>BOOK REVIEWS</b>	215

TOM DALE, Editor

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**THOMAS JEFFERSON—SOIL CONSERVATIONIST.**—Jefferson was one of a small group of early conservationists who attempted to keep the soil productive and stable. He was an ardent advocate of a sound agriculture for early America. He recognized the menace of soil erosion and attempted to stop it on all of his farms by using contour tillage, crop rotation, and other conservation practices.

Jefferson owned or operated nearly 4,000 acres near his home at Monticello. Much of this land was inherited from his father, Peter Jefferson, in 1767. The remainder was accrued by Thomas, while still a young man. The Poplar Forest estate of more than 4,000 acres was inherited by his wife in 1773.

Thomas Jefferson was a philosopher, an educator, a politician, a statesman, an architect, and an inventor. But, above all, he considered himself a farmer and seemed to be proudest of his achievements in farming, especially in his soil conservation practices. Unfortunately, too many of his contemporaries did not heed his admonitions about the care and management of the land.



**FRONT COVER.**—The home designed and built by Thomas Jefferson on his Poplar Forest farm in Bedford County, Va. This 152-year-old house has been preserved much the same as when Jefferson resided there.

—Photo by Gordon S. Smith

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# Poplar Forest— Jefferson's Bedford Farm

By GORDON S. SMITH

**T**HOMAS JEFFERSON'S scientific farming methods and soil conservation practices on his Monticello, Shadwell, and other farms near Charlottesville, Va., have been well advertised. Little has been written, however, about the contour farming, mulching, crop rotation, cover cropping, and other soil conserving practices he carried out on the "Poplar Forest" farm in Bedford County, Va., even though this farm was larger in area than the Jefferson holdings near Monticello.

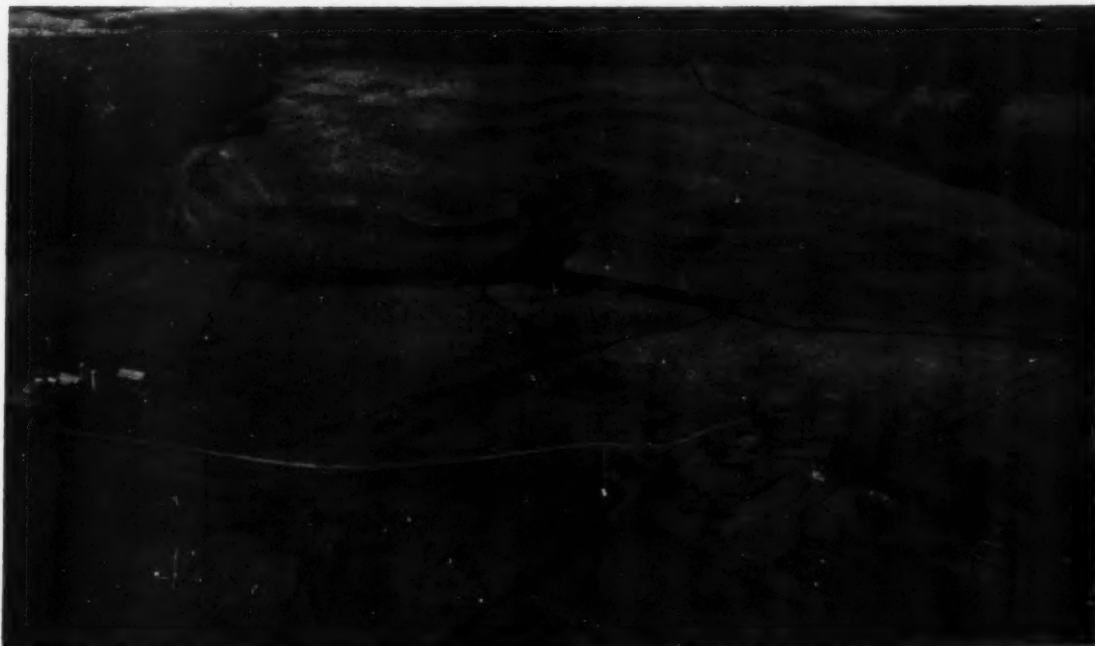
In Jefferson's day, the Poplar Forest farm about 90 miles southwest of Charlottesville, was

a 4,819-acre tract lying between Lynchburg and Bedford. He inherited this land from his wife's father in 1773.

Jefferson made few visits to his "Bedford Possessions" until 1781. At that time he was forced to take his family there to keep them and himself from being taken prisoners by the British raider Tarleton. Jefferson and his family stayed at one of the farm houses on the Poplar Forest tract while Tarleton combed the Monticello area in vain. After this visit, Jefferson began to take more interest in improving his Bedford farm.

As political popularity increased for Jefferson, he felt the need for a retreat from his

Note:—The author is information specialist, Soil Conservation Service, Upper Darby, Pa.



Poplar Forest farm as seen from the air. Modern farm buildings at left and old Jefferson home at right, with stripcropped field in the distance.

ever-present public. In 1806, while serving his second term as president, he started a new home at Poplar Forest. The home was similar to Monticello but much smaller in size. This home still stands.

In the years that followed, Jefferson spent more and more of his time at Poplar Forest. Only the closest of friends were invited to the retreat. Much of his writing was done there. His interest in agriculture and conservation increased as his years at the farm went by. In one letter he wrote, "No occupation is so delightful to me as the culture of the land."

After Jefferson's death, the major part of Poplar Forest was passed down to his grandson, Francis Eppes. Later it was passed on to the Hutter family, who had been Jefferson's neighbors. It stayed in the Hutter family for 118 years until James Watts, Jr., a Lynchburg lawyer, purchased the remaining 1,003 acres and the old home from the Hutter estate.

It was Mr. Watts, with his interest in good land use and modern conservation farming, that brought Tom Jefferson's conservation dreams to life again on his old farm. The fields had been idle for years. Gullies scarred the rolling hills that used to produce tobacco, corn, wheat,

and clover for Jefferson. The entire farm was in poor condition.

Watts' first step was to sign a cooperative agreement with the Blue Ridge Soil Conservation District. This made him eligible to get technical help from the local Soil Conservation Service technicians assigned to the district. Being a lawyer, not a farmer, Watts wanted a good farm manager to make something out of his 1,003-acre run-down farm. In 1950, Elmer E. Obenchain, just out of college and just married, took on the farm manager job.

"Put the farm on a paying basis," was Watts' main request. No outside money would be put in the operation. It was a welcome challenge for Obenchain and his up-to-date conservation ideas.

Following the technical advice of Sneed Adams, SCS technician for the Bedford County area, and the conservation farm plan he and Adams made, Obenchain started making the changes that he felt would take the farm out of the red and at the same time protect the eroding acres of Poplar Forest.

Much of the land that Jefferson had used was now covered with a century's growth of trees and brush. According to the conservation plan, most of this land was suitable for crops or pasture. The farm was now an expanding dairy operation. Obenchain needed to expand his crop and pasture acreage. So he set up a land clearing timetable. Each year several acres were cleared. In 8 years he and his two helpers cleared 200 acres of brush and woodland.

Each year, as crop demands and time allowed, Obenchain plowed more acres of cropland on the contour. The easy roll of the land and the soil types make it ideal for contour strips. The farm now has a total of 250 acres of strip cropping plus diversion terraces and grassed waterways that carry off the excess rainwater safely to the nearby stream. The gullies have healed over. Corn, hay, and grain crops planted in rotation in the strips are producing more per acre than ever before.

Even with all this land clearing, Poplar Forest still has more woodland than open land. Managing a total of 420 acres of woods is an important part of the farm plan. Added to this are a few fields that were too steep or too badly



Elmer E. Obenchain, the present manager of Poplar Forest farm.



eroded to farm. These areas are being planted in trees or wildlife shrubs. The wildlife shrubs serve the double purpose of protecting the land from erosion and providing feed for wildlife during winter months.

Today, 75 head of Holstein cows graze the 185 acres of improved pasture. A modern milking parlor and bulk milk tank handle the milk production. Obenchain plans to increase the size of the herd gradually as the farm shapes up.

In normal years, Obenchain has an ample supply of hay for his herd. In dry years, he may buy some. To eliminate this problem, plans have been made for a 5-acre farm pond to be

built near the old home. An irrigation system drawing water from this pond will keep the crops going during dry summer months, and the historic old home will have some much-needed fire protection too.

After 8 years of meeting the challenge, Obenchain has pulled the farm out of the red. The conservation practices that Jefferson wrote about are proving themselves. Looking across the contoured fields and green pastures from the picturesque old home, one can't help thinking that Tom Jefferson would be quite pleased to see his conservation dreams coming true on his Poplar Forest farm.

## Productive Partners— SCDs and FFA Chapters

By CLAUDE D. CROWLEY

**C**OOPERATION between soil conservation districts, Vocational Agriculture departments, and SCS technicians in Tennessee has paid off blue-chip dividends in the form of on-the-land conservation. Each organization, doing what it is best qualified to do in a coordinated program, has given a surprisingly large boost to the other.

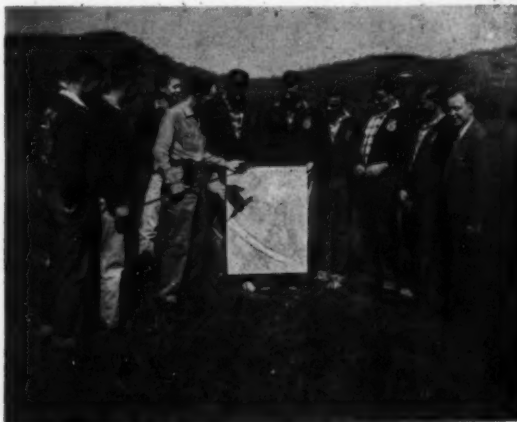
In west Tennessee's Chester Soil Conservation District, a program was systematically carried out by the district, Chester County high school's FFA Chapter, Vo-Ag Instructor A. C. Jones, and Soil Conservation Service Technician Richard Kirby.

The cooperative objectives were outlined at a get-together with the Chester Future Farmers of America and their fathers. Kirby then spent 2 days in classroom instruction with the high school's four agriculture classes. Later, the FFA boys spent a day in the field with Kirby, Jones, and Soil Scientist Bill Brown. Result: Every family represented in the FFA applied for a conservation farm plan. The maps are being made and the plans worked out as rapidly

as possible.

"Cooperation from Vo-Ag Instructor Jones and the FFA chapter has been splendid," Kirby commented, "and our geared-together program has made our job a lot easier and more productive."

In a similar program, the Carthage FFA



SCS soil scientist discusses soil type, slope, erosion, and land capability with members of the Carthage FFA chapter.

Note:—The author is work unit conservationist, Soil Conservation Service, Knoxville, Tenn.

Advisor, Nathan Bastain, met with the Smith SCD board and enlisted the supervisor's assistance in outlining the conservation problems, which were of concern to his boys. SCS Technician R. L. Dudney and other agricultural workers helped.

After problems were brought out into the open, the group cooperatively set the objective of making a farm conservation plan on each chapter member's home farm. Making a basic farm plan and giving full assistance in applying it was considered to be the best way of teaching soil conservation to the boys and combatting the soil depletion problems.

Maps for the 40 farms were provided the boys, and they were given classroom and field lessons in their use. They then took the material and information home and started working out plans with their fathers. A visit was made later by Technician Dudney to help complete the conservation plans.

"These father-son teams did a bang-up job of making sound land use and treatment decisions," Dudney said.

Accomplishments by the Carthage FFA Chapter include: 40 farm conservation plans developed, 20,000 tree seedlings set, 10,000 plants for wildlife food and cover, 2,500 trees planted on the county hospital grounds, and cooperation in the forest fire control program.

In the Knox SCD, over 50 percent of the



FFA boys of the Dickson chapter clearing site for a waterway on the home farm of one member.

district's conservation farm plans have been made as a direct result of SCD-Vo-Ag activity since they started working together 3 years ago.

The district's five Vo-Ag instructors got together and asked the SCS technician to assist them in teaching conservation and land-use planning. This was suggested by Dr. A. J. Paulus, agricultural education professor at the University of Tennessee, who was helping the teachers work out their programs. The resulting meetings, at both the high school classes and the adult evening classes, brought the programs closer to each other. There was a natural rise in interest from the FFA boys and their parents. The district received a terrific surge of applications for conservation farm planning assistance.

"I consider this a wholesome example of how two agencies can help each other," Dr. Paulus commented, "each doing what it is best qualified to do for the other. The instructor is usually on closer, more amicable terms with his community's farmers than the technician. The conservationist has at his fingertips soils and technical information that he readily provides."

This kind of cooperation has led to the profitable promotion of worthy projects in many districts. In Tipton SCD, the FFA chapter distributed Soil Stewardship Sunday material for the board of supervisors. The board bought the stewardship publications from the National Association of Soil Conservation Districts, and



Ronald Conrad (Center) of the Newport FFA chapter shows judges of the Cooke SCD Conservation Contest a cover crop recently established.

delivered them to the FFA chapter. Chapter members took materials for each church represented. These were delivered to the ministers by the young men.

"This would have been a terrific job for the board alone," Billy M. Johnson, work unit technician, explained, "and they would have had to contact many ministers with whom they were not acquainted. This way, the job was made easy as the minister was encouraged to have a Soil Stewardship service by a member of his own church." The coverage was complete and the results exceptionally good.

The Cosby, Parrottsville, and Newport FFA Chapters in Cocke district made the Soil Stewardship Sunday observance more meaningful and effective with the same arrangement. In addition, the Cocke chapters carried on a comprehensive educational program to stimulate conservation interest throughout the county. The chapter members competed against each other in a Soil and Water Contest sponsored by the board of supervisors. The Future Farmers were judged on the quantity and quality of conservation work they had helped install on their home farms.

The Dickson chapter outdid them all in stimulating interest in a Soil Stewardship Sunday service among the county's ministers. They took the preachers to the field on a conservation farm tour.

Last year represented a turning point in the soil conservation district-FFA relations. Up to 1958 individual programs were worked out in each district. Most of Tennessee's 93 districts were cooperating with the Vo-Ag departments with a local arrangement, but each was individually worked out, and there was little exchange of ideas. In 1958 an opportunity was provided for coordination on a statewide basis. The Bankers Service Life Insurance Company of Oklahoma City, Okla., in cooperation with the Tennessee Association of Soil Conservation Districts, offered prizes totaling \$2,500 to encourage FFA chapters to participate in an organized conservation program.

Attractive guide books containing the points on which chapters would be judged and the rules for the program were printed and distributed to all chapters in the State. Most participating districts offered additional prizes on

the local level. Winners from each soil conservation district were judged on the FFA sub-district level; then the State winner was chosen. The top subdistrict chapters received \$25; the State winner, \$200.

Winning was no snap. Chapters were judged on their proposed program of work, the conservation activities they sponsored, conservation measures applied on members' farms, a conservation scrapbook of the chapter's program activities, a report, and participation in a conservation speech contest.

The Rebel Hill Chapter in Warren SCD took first year honors in this program. Their winning activities covered an unbelievably wide range. They sponsored five local conservation tours, and conservation movies for community groups and schools. They had a land judging contest, an essay contest, a speech contest, and a jingle contest.

They shared with the district in sponsoring Soil Stewardship Sunday. They participated in many radio programs featuring the FFA interest in conservation.

In addition to all this, they applied a wide variety of conservation measures to their home farms that affected cropland, pasture, meadow, woodland, and wildlife areas. They built a drainage system. Five members helped build stockwater ponds on their farms. Alfalfa, sericea and other special crops seeded, sod waterways established, contour farming practiced, and many other conservation practices applied.



Charles Patton, FFA member of the Rebel Hill chapter, receives the FFA-SCD conservation award from Philip White, vice president of Bankers Service Life Insurance Co.

The chapter seeded and beautified the eroded school grounds.

Chapter President, Charles Patton, accepted the State prize from Phillip White, vice president of Bankers Service Life on behalf of the Rebel Hill Chapter. The presentation was made at the Tennessee Association of Soil Conservation Districts' annual banquet in Nashville, November 5. Advisor Charley Roy was a guest of the association and received recognition for his outstanding work with the young men of the chapter.

"We are gratified that the participation in the SCD-FFA program was so good the first year," TASCSD President John S. Wilder said, "and we are planning to achieve cooperation for even greater effectiveness next year."

The TASCSD convention adopted a resolution recommending that all Tennessee boards of supervisors contact the FFA chapters in their districts, offer their assistance, and encourage their participation.

## Conservation Farmer Of Hawaii

By HERBERT YANAMURA  
and HOWARD COOPER

**S**EISO Otaini of Olinda-Kula Soil Conservation District, Island of Maui, received the first territory-wide "Conservation Farmer" award at the 1958 conference of the Hawaii Association of Soil Conservation Districts at Lihue, Kauai. He won out in competition with top farmers from 15 other districts in Hawaii.

Located on the slopes of Mt. Haleakala on Maui, Seiso Otani operates a model conservation farm. Mulching, sprinkler irrigation, asphalt-lined reservoir, crop-residue utilization, and cross-slope farming are some of the standard practices on this farm.

Otani's chief crop is pineapple—among the most delicious produced anywhere. All of his 18-acre crop is mulched, sprinkler irrigated, and cross-slope farmed.

Note:—The authors are work unit conservationists. Soil Conservation Service, cooperating respectively with the Kailua and Kahului Soil Conservation Districts in the Territory of Hawaii.



Territorial Governor Quinn congratulates Mr. and Mrs. Seiso Otani on winning the top conservation award for Hawaii.

He says, "A good mulch has helped us save a lot of moisture in our water-starved section of Maui. Mulching, we've found is the best way to protect soil from wind and water erosion. It adds needed organic matter to soil too and really cuts the weed problem. Installing a 60,000 gallon reservoir and sprinkler system, reduced irrigation time in half."

Equally deserving of the conservation award is Seiso's wife, Tsugie, who puts in her full time on the farm in addition to handling the multitude of household chores. Her efforts play a key role in the successful operation of the 37-acre Otani farm, which has beside pineapple, truck crops, orchard, and pasture. The only operations that require additional help are harvesting and planting of pineapple.

Seiso Otani was born 52 years ago on the island of Maui to immigrant parents who came from Japan in 1900. For many years Seiso's parents were engaged in farming, the occupation he chose for himself. In 1931, Seiso married Tsugie Nagata and later they became parents to two sons. Both sons have received college educations, one at Woodbury College in California and the other at the University of Hawaii.

To further his knowledge of agriculture, Seiso Otani plans to some day travel to the mainland of the United States and to parts of South America and observe farming operations there.



# Water Is Worth What It Costs

By FLOYD W. DORIUS

THE 95 ranchers of the Pleasantview Grazing Association in the Oneida Soil Conservation District of Idaho seem to think that livestock water is worth almost anything it costs to get it. At least, they put up about \$2,300 in cash and work to get a stockwater pond that would accomodate about 300 cattle for 3 or 4 months. And, they plan to build more such ponds, some of which may be even more expensive.

The first Pleasantview pond was a community undertaking. The material and labor costs were shared by the grazing association, the Oneida Soil Conservation District, and the Bureau of Land Management of the U. S. Department of the Interior. The Soil Conservation Service designed and supervised installation of the project.

Large areas of summer range in the Oneida district are improperly and inefficiently grazed because of a lack of livestock water. Of the 540,000 acres of rangeland, about 250,000 acres have insufficient water, especially during July and August. Most of the sites available for stockwater ponds have porous soils that will

not hold water without special treatment. A great part of the moisture that falls on these high ranges comes as winter snow. Most of the melting snow water soaks into the porous soils and appears as springs or surface streams only in the valley far below.

For years, ranchers let their cattle graze the range as the snowline receded in the spring. The livestock ate the snow for water as they gleaned the green shoots of forage as fast as they appeared. This practice greatly depleted the desirable forage plants.

After the snowbanks were gone at the higher elevations the livestock were forced to travel 6 to 8 miles to the valley streams for water. Being reluctant to make the trek back to the higher grazing lands, they trampled and exterminated the desirable vegetation in the canyon bottoms where the trails lead to the valley water.

Without water, during July and August, the cattle get thinner and the vegetation gets dustier as the heat, travel, and trampling take their toll. Tired, sore-footed bulls lose interest in assuming their paternal responsibilities. Livestock congregate at the valley cattle guards. If given opportunity, they roam the

Note:—The author is work unit conservationist, Soil Conservation Service, Malad, Idaho.



With all the water gone from upland grazing areas and most of the grass grazed into the ground or trampled out near the water holes, these cattle want to go home if someone will open the gate for them.



A portion of the plastic covered watershed and the bentonite sealed pond in the Oneida district.

highways through cultivated sections glean- ing what feed they can as they head for home. Many of these cattle weigh less than they did when turned on the range in the spring.

The Pleasantview ranchers decided that there must be a way to keep much of the snow water on the hills, so that their cattle could use it during the dry summer months. They asked the soil conservation district and SCS technicians to help them solve this problem. As a result, they decided to cover the porous soil on which some snow banks rested with plastic sheeting, and to seal their manmade pond below with bentonite.

They removed all brush and grass and smoothed an area of several thousand square feet where deep snow drifts normally accumulate. They covered the watershed area with polyethylene plastic sheets, weighted down by rows of small rocks and pebbles. They built a rail fence around the entire small watershed and the bentonite sealed pond below to keep the cattle from trampling either. The livestock are watered from troughs below the pond that have automatic flow controls.

True, such developments are costly, but how

much will you pay for a drink of water when you cannot buy it any place else? This project cost \$2,300, including the access road; the budget limit agreed on by the financing parties. For permanency, it should have cost more. The plastic apron covered 16,500 square feet. The bentonited pond below held 234,000 gallons of water. The maximum water depth was  $7\frac{1}{2}$  feet. The area was surrounded by a 6-log high, zig-zag fence.

The plastic used should have been covered with pea gravel and tar instead of dirt and rows of rock. Polyethylene is punctured by sharp rocks and sticks. Other materials such as soil cement, tarred tin mounted on treated logs, or a covering of burlap and tar may be better than plastic.

What are the returns of such an investment? What value does the grazing association place on such a development? President Perry Ipsen, range rider Mario Lewis, and allotment user Myron Jones made a start at answering these questions. These ranchers are all cooperating with the Oneida district in using soil conserving practices on their own ranches and farms. Ipsen has been producing, buying, and selling

choice beef with his father and brothers ever since he got his first pair of riding boots. His factual answers were convincing, "The association would like to put in a snow pond each year. We would have put another in last spring had we not used our allotted money for the pump in Wood Canyon as we agreed to do a year ago."

Rider Lewis' answer was: "You tell me how much that project weighs and I'll tell you what it's worth." When asked what weight had to do with it, he bantered, "Well, I've heard some of the association members say, 'It's worth its weight in gold'."

Getting serious, Lewis declared: "You can look at the cattle this year and tell which ones are watering at the new pond—they have a slicker finish than the cattle trailing to the valley for water. They are 200 pounds heavier." He had noted 250 to 300 head watering at this development. He informed me that one dry year it had cost \$1 a head per month to haul water to cattle.

Rancher Jones is making conservation use of his time until the Soil Conservation Service can help him complete his basic farm plan. With SCS and ACP assistance he has established more than 100 acres of contour strip-cropping on his wheat land—alfalfa grass strips alternating with strips of grain. Just as soon as the grain strips are harvested, his range cattle can be pulled off the public range and grazed on these strips. He will not need to turn the livestock into the fields as early as last



Plastic apron at the edge of bentonite sealed pond.



Water trough below pond.

year. He said: "It looks like I can keep the cows on the range a month longer from the looks of the water in the pond. I also expect a better calf crop next year. It seems the breeding season has been extended by that water development."

How profitable is this development? Two hundred pounds of beef times 300 cows plus a better calf crop, plus more range feed are part of the profits. And if the development is maintained, the livestock are not turned on the range before the grass is ready for use, fences are built and livestock are uniformly distributed by riding, salt location, and other stock water developments, the range is going to get better and better and the profits may multiply.

Game tracks show that this water development also is being heavily used by deer.

**LIVESTOCK FEED FROM BRUSH.**—Range specialists of the California Division of Forestry have been conducting tests to determine the possibilities of making livestock feed from native brush.

Chemical analysis of one species of brush tested shows it has a feed value similar to oats or sudangrass hay, and is as good as some grades of alfalfa. To make the feed, entire brush plants are cut and ground into meal in a hammer mill, then made into pellets. A small amount of molasses is added during the pelleting process to increase palatability of the feed.

# Range Improvement In Australia

**S**EEDING and fertilizing ranges and pastures by airplane has become a fairly common practice in many sections of Australia during the past few years. Most Australian soils are notably deficient in available phosphorous. Heavy grazing, mainly by sheep, has greatly depleted desirable vegetation on large acreages during the past few decades. Serious soil erosion and declining productivity have resulted on large areas of grassland.

At present, there is great interest among Australians in range and pasture rejuvenation. Recently, a "look-and-learn" field day was held in New South Wales to demonstrate modern techniques in pasture improvement. More than 1,000 farmers attended, some driving hundreds of miles to be present.

Staged at "Gundowringa", a 6,000-acre property, about 120 miles south of Sydney, the field

day gave vivid evidence of the benefits of planned pasture improvement.

The visitors were shown how "Gundowringa" had once been "sorry" country. They were shown a narrow strip of land that had been left untouched and had become near-barren, eroded, and useless. Then they were shown alongside it wide, green swaths of fertile countryside, thick with good-eating grass and no erosion—the result of planned soil and pasture improvement.

A fleet of light aircraft was used to show the latest methods of aerial top-dressing and the advantages of bulk field dumps of superphosphate instead of bagged lots of fertilizer.

Skimming across the heads of the crowd, the small planes landed right beside the field dumps and were refilled by mobile tractor loaders. It took only a few seconds before each plane was back into the air again and spreading fertilizer across the pastures.

Note:—This article and photographs were furnished as a news release issued by the News and Information Bureau, Department of the Interior, Commonwealth of Australia.



Bulk fertilizer being stored at field dumps so that it can be scooped up by mechanical shovels and transferred to airplane for spreading.



The visitors were shown how the superphosphate in bulk could easily be transported from railhead or direct from the factory to the field dumps. They were shown how wind and water-proof field dumps could quickly be erected.

The ground at the site of a dump is treated with a special oil-base sealer to keep out dampness, and then portable walls and hatch covers are erected. Such field dumps can be used just as easily for bulk-spreading from the ground as from the air. The fertilizer is simply loaded by mechanical shovels into the truck spreading units.

The visitors were told that by using the right amounts of fertilizer combined with sowings of the correct types of grasses they could improve their pastures and lift production to new levels.

They were told it need not take as long as it had at "Gundowringa" because modern methods such as aerial top-dressing and bulk-handling of fertilizer were short-cutting the old procedures.

At "Gundowringa" the pasture improvement program began back in 1904 when the property was first taken over. It was described at that time as "supporting wiry native grasses, virgin and ringbarked forest, and fallen trees intermingling with the meagre grass supply."



Spreading fertilizer on a pasture the Australian way.

The native grass areas of the property carried less than one sheep to the acre and the stock condition was poor. The average wool cut was between 6 and 7 pounds for each sheep. Today the improved pastures carry more than two sheep to the acre—plus lambs—and the average wool clip for each sheep is more than 13 lbs.

Where once the soil was light and poor it is now dark and rich. Where once the soil had been washing away now even the steepest hills are covered with desirable pasture vegetation.



Mechanical shovel loading bulk fertilizer in airplane.

# ANTHRAX—A SOIL BORNE DISEASE

By G. B. VAN NESS

## No. 44

This is the forty-fourth of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

ONE of the oldest recognized infectious diseases of livestock, anthrax, is caused by an organism which will persist for many years in the soil. Although this disease has not yet become as extensive in the United States as in Old World anthrax districts, outbreaks of serious proportions have occurred in 1954, 1957, and 1958. Based on soil prediction studies made by USDA scientists, observations on soil physiography were included in the control of these outbreaks.

The cause of anthrax is *Bacillus anthracis*, a spore-forming bacterium. It is isolated with difficulty from soil, yet its recurrence in definite portions of farm lands in so-called "anthrax districts" is convincing evidence of its soil-borne nature.

Although off-season anthrax may be traced to food-borne or other sources of infection, very few outbreaks occur unless the daily minimum temperature is higher than 60°F. With a daily minimum temperature higher than 60°F., anthrax may be a serious problem in regions where the soil pH is higher than 6. The same limitations are encountered on laboratory media; therefore, the factors are probably physiological, although competition by molds and other organisms in acid soils may be a factor.

Eastern soils, with their lower pH, have from time to time been contaminated without becoming anthrax districts. Western soils, particularly on the Great Plains, show an increasing incidence of the disease. Some neutral glaciated and marine soils of the East have almost annual outbreaks, but of minor importance. This indicates a delicate balance, and strengthens the premise that soil pH of 6 or higher is a prerequisite for an anthrax district.

Serious anthrax outbreaks are often seen when a dramatic alteration occurs in the seasonal weather pattern. The 1954 outbreak on the Mississippi delta below New Orleans accompanied a prolonged, stationary low stage of the river due to drought in the Midwest. The 1957 outbreak in Oklahoma-Kansas occurred after prolonged rain followed by severe dry weather, as did the 1958 outbreaks along the Mississippi River from Louisiana to Illinois.

In studying weather data related to the 1957 Oklahoma-Kansas outbreak, it was observed



Local swelling, due to anthrax. Death usually results. This disease is also common to horses and mules.

Note:—The author is veterinarian, animal disease eradication division, Agricultural Research Service, Washington, D. C.

that a similar flood-drought situation occurred in 1951, when anthrax was also a problem. The 1958 outbreaks near Monroe, La., were associated with a weather pattern also observed in 1946, when serious anthrax losses occurred in northern Louisiana.

These studies point to the probability that biological conditions contribute to anthrax outbreaks. The absence of any one of these biological conditions serves to limit the appearance of soil-borne anthrax.

The flood-drought combination with high soil pH and high temperature suggest a propagation phase may be involved in severe outbreaks. What we look for is evidence of changes which, when absent, cause no trouble. Usually we find damaged vegetation that is first injured by water, which has stood over the grasses and their roots, and then is left exposed high and dry during a drought that follows the flood. The role of insect carriers is depreciated by the frequent restriction of the disease to small pastures with damaged vegetation. Insects are dangerous spreaders to man, however, especially where they cause wounds in the skin which may then become infected with anthrax organisms. But damaged vegetation is a key indicator of the anthrax potential of an area.

Soil conservationists are usually concerned with limiting water damage to vegetation. The most obvious of these is water damage by flooding streams, and most anthrax outbreaks occur along water-courses. Fine silt dried on dead and decaying vegetation may carry many spore-forming organisms, and it is easy to visualize the presence of the spores of *Bacillus anthracis* as well as the nonpathogenic forms.

Anthrax may also occur away from stream valleys, and in some cases on apparently high ground. Here improperly constructed terraces, borrow pits, buffalo wallows, slick spots, alkali flats, and land slips may produce entrapment areas that resemble small alluvial flats. Almost all of these potentials may be encountered in the anthrax areas west of the Mississippi River.

Ponds which serve as a water supply for livestock have a very high anthrax potential. This was particularly noticeable in the 1957 Oklahoma-Kansas outbreak, since almost all the ponds had been dry and contained growing vegetation. Ponds may contain alluvial flats



Dead grass around a small pond. Eight of 20 cattle that frequented this premise died of anthrax.

which under normal conditions are above water. Under prolonged flow of ground water from saturated soil, the vegetation on these flats may suffer severe water damage. This is so common in anthrax outbreak areas it is suggested that fencing of ponds with the installation of float controlled water tanks may help prevent an outbreak of the disease.

Fairly level but poorly drained land may become saturated to the surface under prolonged rainfall, causing damage to vegetation. The cultivation of this land may be unprofitable, and it may be in permanent pasture. Livestock owners with limited acreage may use lime and



This pond had a much higher water level, causing the death of grass on the silt filled area. Serious losses from anthrax occurred on this pasture.

fertilizer to improve the soil, changing an acid soil toward the alkaline side. This is often observed in cotton growing sections where low ground is usually in pasture, and mules pastured there suffer serious losses from anthrax.

Special conditions brought about along drainage ways may result in conditions favoring anthrax. The spoil of banks of ditches often trap water, forming small or large alluvial areas, which after contamination with anthrax organisms may be the sites of future outbreaks. This potential is quite high in the flatwoods of south and central Florida, where a calcareous marl is found under the acid sands. An expansion of the cattle industry in recent years has been accompanied by drainage of the flatwoods for pasture. An anthrax potential is already known in the area.



A silt deposit in the channel of a diversion terrace that was present on a farm having serious losses from anthrax.

Interestingly enough, anthrax is practically unknown on first-class agricultural soils. The practice of liming good soils, now too acid for many crops, is at present of little concern. One exception occurs, in that rice farming is an agricultural practice with a high anthrax potential. The controls remain the same, however, where resting rice fields are pastured by cattle or livestock.

Soil conservationists are in an excellent position to further the understanding and control of anthrax. The United States is fortunate at the present in having a low incidence of anthrax. What we learn today may serve materially to lessen this potential in the future,

and it may even be possible by good soil practices through the cooperation of soil scientists and disease-control specialists to eliminate this disease as a serious threat to livestock and man.

## Supplements To Classroom Work

By ROBERT H. MILLS

THE Divide Soil Conservation District, Ohio, is cooperating with the Crawford County, Ohio public schools to develop a progressive conservation education program for the county. In addition to regular classroom studies on conservation, the district sponsors extracurricular activities among youth groups to stimulate further interest. The supervisors of the district are firm believers in the adage that the leaders of the future are the youth of today.

Major activities in the program to develop tomorrow's leaders are the biennial High School Conservation Field Day for juniors and seniors; the annual FFA Land Judging contest; and the Boy Scout Field Days in forestry and wildlife management.

Other conservation-education activities sponsored by the board include conservation air tours, forage field days, terracing demonstrations, county fair exhibits, farm pond tours, 5-ton hay contest, hay and pasture tours, and annual conservation banquets.

Last fall 550 students and teachers from the 10 rural schools and the Bucyrus conservation class took part in the High School Conservation Field Day at the Ralph Worden farm near North Robinson. They toured the farm and heard conservation leaders explain the conservation practices. The arrival of each school group was timed to permit relatively small groups at each stop. Each tour lasted about 1½ hours. The field day is held every other year to give each student a chance to see and study the management of soil, water, forest, and wildlife resources as practiced by farmers in Crawford County.

Note:—The author is work unit conservationist, Soil Conservation Service, Bucyrus, Ohio.



The Vocational Agriculture students compete each spring in a land judging contest designed to teach an appreciation of soil differences, land capability, and proper land use. The district board, as cosponsor of the contest, awards a prize to the winning FFA team. In 1958 the Lykens Rural High School team won second place in the State Land Judging Contest at Columbus.

Boy Scout Forestry and Wildlife Management Field Days are the most recent conservation-education activities sponsored by the board. These events are devised to teach resource management to both town and country students. They speed up woodland improvement work and enable the Scouts to complete part of the requirements for merit badges in conservation.



County agent explains the layout and conservation plan of the Worden farm to students from Tiro High School.

A recent reunion of graduates of the Ohio Conservation Laboratory at Bucyrus, provided an excellent opportunity for teachers from 16 counties to review local progress in conservation-education work. The laboratory is one of the outstanding workshops in the country for training teachers in conservation. It is sponsored by the Colleges of Education of the five State universities; the Ohio Department of Education; and the Division of Wildlife, Ohio Department of Natural Resources.

Ralph Worden, veteran leader in the local conservation-education program, who helped organize the soil conservation district in 1945 and who served 12 years as supervisor, told



SCS technician discusses soil classification and management with students from Mt. Zion High School.

recently of the contributions made by local groups to the coordinated program.

Worden recalled the excellent cooperation received by the board from local schools, Boy Scout troops, Granges, Farm Bureau advisory councils, the Soil Conservation Service, the Agricultural Extension Service, the Crawford County commissioners and engineer, churches, newspapers, radio, the Ohio Divisions of Forestry and Wildlife, the Crawford County conservation league, and others.

The board reviews each year's program in planning future events. In 1959, a Drainage Field Day will stress tile and surface drainage. A Farm Pond Tour will emphasize fish management and the control of undesirable vegetation.



Crawford County FFA members get instructions from SCS soil scientist on the land judging scorecard.

# Wildlife Benefit From Controlled Burning

By H. LEO WILSON

THE Bighorn Basin Wildlife Club looks upon the conservation of wildlife as a job for everybody. Its members insist that the people who live in cities and towns, especially those who enjoy the thrills of good hunting, can help do the job along with the farmers and ranchers. And good hunting, the club members remind you, depends on providing game birds and animals a place to live, and on giving them the food and cover they need to grow and multiply.

The club has gone a long way toward proving this point. It was nearly a year ago that the club agreed all was not as it should be so far as game and hunting were concerned. They decided to do something about it. The game about which they were especially concerned were pheasants, chukar, and Hungarian partridge. Their first move was to ask the Wyoming Game and Fish Commission for advice. George Burnap, Jr., then game warden, Don Johnson, bird technician, and Louis Pehacek, fish biologist, agreed to help.

Food for wildlife obviously was not the problem. Barley and oats are plentiful in the irrigated valley. Sweetclover and sunflower

thrive in odd areas. The main problem, it was found, involved the burning out of canals and ditches each spring, because the fire nearly always destroyed wildlife cover along the ditches. Nesting wildlife then moved to adjoining fields only to encounter more hazards in the sickles and wheels of farm machinery.

So members of the Bighorn Basin Wildlife Club decided to help farmers develop a plan for "controlled burning" of canals and ditches. Club members called on the Washakie Soil Conservation District for help. Dan Herman, assigned by the Soil Conservation Service to work with the district, furnished a map showing the location of farms in the area. On the map, the club marked off 13 areas and picked a field captain from its membership for each. Each captain picked a team. Team members knocked on farmhouse doors, asking for permission to supervise the burning of the canals and ditches on each farm. When the farmers understood the aims of the club, they readily consented to the idea. Most of them, like the club members, were interested in the conservation of wildlife.

At burning time, crews armed with torches and wet sacks moved in to burn weeds and trash in the canals and ditches. They confined the fire to the ditch proper. However, this was a slow, tedious way to do the job. Somebody thought of a truck-mounted sprayer which the Pure Gas Company used to control weeds on their tank locations. The company agreed to lend the tank to the club and also gave the club the use of a 15-gallon high-pressure butane

Note:—The author is State soil conservationist, Soil Conservation Service, Casper, Wyo.



Bighorn Basin Wildlife Club members burning weeds from an irrigation ditch.



Irrigation ditch after burning, with wildlife cover left on each side of ditch.

burner. The two pieces of equipment made an effective combination. The Game and Fish Commission loaned the use of a portable pump for areas that could not be reached with the larger equipment. The result of the club's campaign was that many acres of good wildlife cover were saved for nesting and protection.

"This is probably the first time a wildlife club took on a job of this kind in Wyoming," Vice President Harry Sprague of the club explained. "Our work saved a large acreage of good nesting cover. But perhaps even more important was the greater consciousness of everyone in wildlife conservation."

Interest in the work spread throughout the community. The club membership jumped to 352 members. Other projects the club has under way include: (1) Sponsoring a series of talks by Louis Moos, Soil Conservation Service biologist, before service clubs, schools, and other groups; (2) Awarding \$100 each year to a farmer making a worthy contribution to wildlife; (3) Urging passage of a State law to insure each purchaser of a hunting or fishing license for \$10,000 against public liability or property damage while hunting or fishing; and, (4) Distributing hundreds of bulletins and leaflets from the Game and Fish Commission and the Soil Conservation Service to persons interested in the conservation of wildlife in the area.

## A Decade Of Service

By W. L. VAUGHT

**R**OBERT E. VORE, who has a combination livestock and small grain farm near Beulah, Wyo., has served as a supervisor of the Redwater Soil Conservation District for the past 10 years.

Bob became interested in the workings of a soil conservation district back in 1947, after going to county information meetings conducted by the county agent. The county agent was telling the folks in the county that conservation could be speeded up and a more complete job accomplished through a district. After some discussion and reading, Bob decided that he and the folks in his neighborhood could use a soil conservation district, and he set out to help get one organized.

"The going was pretty rough for awhile because most folks didn't know what it was all about," Bob said. "Most everyone was interested in conservation, but were leary of the new-fangled idea called a 'district'."

Bob's patience and the respect with which he is held in the area began to pay off. After many miles of traveling to see his neighbors, names began to appear on a petition calling for a public hearing. The hearing was finally held, and the State Soil Conservation Committee approved a referendum. Before the referendum, Bob was again busy explaining the advantages of a district to everyone he could find. He covered every road in eastern Crook County and talked to all potential voters.

With a reminiscent smile, Bob tells of the success of the referendum, and the beginning of a new era for Crook County agriculture. He was one of the first to develop a plan of conservation operations for his ranch, based on land capability. Anyone driving by his ranch today immediately sees what complete conservation can mean to a farm or ranch. All of his small grain is on the contour. Diversion ditches at the head of his fields control runoff, and his grazing land is being managed to permit maximum use while holding his pastures in good

Note:—The author is area conservationist, Soil Conservation Service, Gillette, Wyo.

condition. His hay meadows are always well kept and are producing adequate feed for his livestock operations of fine Hereford cattle.

Visiting Bob on his ranch is an experience to remember. His enthusiasm and sincerity, along with his accomplishments, will make anyone realize that he is interested in the care of the land for the future. Bob has a good reason for looking into the future, too! He and Mrs. Vore are raising five children from this land he is caring for. Four of the children are boys who might also be dependant upon the land for a living someday. The older boys are a big help to Bob, and they certainly have an advantage in growing up and learning on a conservation farm.

At one time the ranch was not bristling with conservation as it is today. Yet, even before the district was organized, Bob recognized that something had to be done if he was to raise his family on this farm. His "red bed" soil was productive but was also highly susceptible to erosion. Too much of his topsoil was being lost through hard rains, and the county road was beginning to choke with silt from his land.

Vore borrowed an engineer's level and began to go to work on his own. The first year he and his hired man laid out contour guide lines on 150 acres. Later he received help through the local PMA office and completed 210 acres of

contour guide lines before the Redwater Soil Conservation District was organized. He had many problems in making the switch from "block farming" to contour farming, but his perseverance has paid handsome dividends—his soil loss is held to a minimum, and the yield increase is most gratifying. Today, contour farming, terraces, diversions, and the like are commonplace in most of the district.

In 1948, Bob was appointed as one of the supervisors of the Redwater SCD for 1 year. Since then he has been reelected three times for 3 year terms. As 1957 came to a close, he had served 10 consecutive years.

Many interesting things occurred in those 10 years. Bob relates that it took some doing to arouse the interest of the people. Many meetings were attended, many miles traveled for several years before the folks began to show genuine interest. Bob became discouraged for awhile because many times not enough of the board members appeared for a quorum; or even worse, he would be the only member present. The general apathy of the people was enough to discourage most anyone, but Bob kept going.

It wasn't as though he had nothing else to do. Bob was also serving on many other boards in the county, including, county fair board, Farm Bureau, school board, and welfare board. He continues to give his time as freely today as 10 years ago. He is president of Crook County Farm Bureau, is still on the welfare board, and recently agreed to serve on the newly organized weed and pest control board.

He points with pride at the way the people are now supporting the Redwater SCD. Businessmen too are supporting the district movement, including active support of the Sundance Bank, Sundance Times, and equipment dealers in Sundance, as well as businessmen in Belle Fourche and Spearfish, S. Dak.

After 10 years of service on the board of supervisors, Bob decided that it was time for "new blood" to take the helm. He knows the district is enjoying the greatest support it has ever had, and he can leave the board with the satisfaction that his efforts, as well as many others, have not been in vain. After attending over 120 meetings, and traveling well over 6,000 miles, many of which were in subzero



Bob Vore displaying a certificate won for being the outstanding conservation farmer in the Redwater Soil Conservation District.



weather, mud, or snow, Bob is entitled to a well-earned rest.

Because all the expenses involved came out of Bob's own pocket, he was asked if he cared to estimate the amount of money he had contributed during the 10 years. Of course, he declined to say, but commented: "It was little enough, as a man's responsibility to the soil. I can now sleep nights through a hard rain-storm with a feeling of security, knowing when I wake up that my farm is still here for my boys. It is gratifying also, to drive over the same roads I travelled in 1948 and see conservation shining on almost every farm. Whatever money I spent these past 10 years has been repaid many times in the satisfaction of knowing that most folks in the district also believe in the future of our county's agricultural resources."

## DISTRICT PROFILE

EARL H. SLY  
of  
SOUTH DAKOTA

"THIS so-called level land needs soil conservation practices too," said Earl H. Sly as he looked out across the stretch of land west of his farmstead that appears to run level clear to the horizon. "When we get more moisture than the soil can absorb, it has to go some place; and, before we put in that diversion terrace, it all seemed to run this way where it was beginning to cut a gully. The water accumulates way the other side of my west boundary which is a half mile from here—and it all drains this way."

Earl and an SCS technician figured out a diversion terrace and constructed it so as to catch the foreign drainage near his west boundary. The diversion terrace then spreads this water, part to the south and part to the north, as it flows slowly around the ends of the terrace and back to its channel.

This is only one of the many soil conservation practices Mr. Sly has on his farm near Platte, S. Dak. He has lived in Charles Mix County all of his life. He and his wife have lived on the home place for 39 years.

The entire family is conservation-minded. Mrs. Sly keeps currently posted by reading every article on conservation that comes to their house and also enjoys entering into discussions about the merits of various soil conservation practices. Earl appreciates that the soil on his farm, and in his township generally, has some limiting factors; perhaps more than most of the land in the other parts of the county. But he has long since become reconciled to live with it and treat the land according to its capabilities.

The first notable conservation practice used on the Sly farm was the tree planting he started soon after he acquired the farm. The first planting has been added to several times until the farmstead and each of four feed lots are nearly surrounded by trees. In addition, there is a 5-acre planting across the road east of the farmstead.

There are 160 acres on the home place. While the floodwaters created by the foreign drainage are now diverted away from the main field, it is planted on the contour to prevent runoff from the field itself. "We try to save every drop of rainwater that falls on the place," Earl states. "We can also 'plug' the terrace if we want to use the floodwaters for flood irrigation. We can then force the water across the terrace just about any place we choose. However, this practice is practical only when the field is in



Mr. and Mrs. Earl Sly holding one of their conservation award certificates.

grass. It would probably start a gully if it didn't have the grass to tie the soil down."

Earl periodically rotates his cropland with grass and legumes and feels that it pays dividends both in immediate returns and by benefits to the soil. He says, "It helps improve soil structure so that it can hold more moisture as well as giving it additional plant food. Our soil gets 'tight' pretty fast after we crop it a few years, and we've got to watch it or soon it won't absorb much water at all below the surface."

Mr. Sly has participated in the TVA fertilizer experiments in cooperation with the Extension Service. He worked closely with the county agent and with Extension soil conservationists, in applying the fertilizer in measured amounts and harvesting the samples to determine the fertilizer benefits. Of these experiments, he has this to say, "We learned that we need to add phosphorous, too, as well as nitrogen and organic matter to our soils." Sly is a charter member of the Charles Mix County Crop Improvement Association and has served as president of this group for 7 years. Numerous grain test plots have been planted on the Sly farm, and he readily volunteers for any such worthwhile project to help make good farming even better.

The half-section across the road has need for more conservation practices than the home place, and Earl has used them there. One hundred and sixty acres of this, which has a sizable acreage classified by the Soil Conservation Service as Class IV land, has remained in native grass for pasture and hayland. Sly has divided it into 4 equal 40-acre tracts for a rotation system. He pastures each 40-acre tract 1 year and uses it for hay the following year. This system makes it possible for each species of grass to live its normal life span at least 1 year out of every 2 years, and for all the grasses to remain pretty much in their original composition.

Earl says, "We attempt to follow the 'full-use' system and to wind up the grazing season by taking half and leaving half the grass."

This division of pastures created a water problem that was solved in the course of time by dugouts or dams. The Class IV lowland, which is common to both north pastures, has had a fairly high water table. Dugouts were

made in each of these pastures on the Class IV sites. The other two pastures are served by combination dams and dugouts and a windmill.

The cropland is more rolling on this land across the road than on the home place. There were some gullies developing before Earl learned about the soil conservation practices that would stop them. Now he has put in a terrace and contour stripcropping system that effectively controls the erosion. Another first in the county on the Sly farm is a fence built on top of a terrace to make a field boundary. "This fence built on top of the terrace eliminates the short rows that would exist between the terrace and a straight fence," Earl says.

Recognition has come frequently to the Slys down through the years, not only for their achievements in soil conservation, but in other pursuits of farming as well. In addition to winning many crop show prizes, the family received the WNAX radio station award for "Home Improvement" in 1949. Earl has won the State Soil Conservation Award, and he was a member of the soil conservation team that won the Sioux City Soil Conservation Award in 1950. Just recently, he attended a short course at Iowa State College at Ames, Iowa, where he was a guest of the Mississippi Valley association to represent South Dakota at that event.

The Slys are taking it a little easier in the semiretirement years of their life. The sons do the farming, but Earl still keeps close supervision on all the farming activities, including soil conservation.

From observations made during their travels, from many experiences gained on their own farm, and from the knowledge gained at the short courses attended, the Slys are more convinced than ever that soil conservation has an important place on all land—even on level land.

—JAMES P. HUGHES

**THE MEANING OF CONSERVATION.**—To me, conservation means use—multiple use—use of the product without damage to the capital—use of the land without impairment of its capacity for sustained production—use of the land within its capabilities—treatment of the land to achieve maximum production—use of the land to provide for better living and better homes—enlarging opportunity for those who live on the land and for those who are dependent on them.

ERVIN L. PETERSON  
*Assistant Secretary of Agriculture*

# Operation—Pond Plug

By ROGER N. LEVESQUE

**N**AVY skin divers made a strange spectacle as they submerged into a farm pond in midwinter. Actually, they were playing "Good Samaritan" in an unusual bit of interagency cooperation.

The operation took place on the Carolina Reserve, part of Rhode Island's Fish and Game Division lands. About a year ago the division built a 4-acre pond. Being a cooperator with the Southern Rhode Island Soil Conservation District they received technical help from the Soil Conservation Service.



Navy skin-diver ready to submerge and to locate and pull the drain plug of the pond.

The pond was finished late in the fall. Grass was planted on the emergency spillway and the dam, but it did not make enough fall growth to protect the raw earth from winter rains, so the SCS technicians advised leaving the pond empty until spring. The plug on the outlet pipe was left off for the winter.

A hitch in the plan came when the SCS tech-

nicians found the pond full after a rainstorm. Someone had dropped the plug in place. Another rain might send the water over the raw-earth spillway and cause serious washing there and around the dam.

Several attempts at dragging the bottom with an anchor and chain proved futile. A call was put in to the nearby Quonset Point Naval Air Station for skin-diving aid. The Navy O.K.'d the request and sent two men to the scene. Equipped with cold-stopping rubber suits and air-lungs, the men dove for the plug. In no time they had it out of the pipe. After a short swim the divers returned to base—mission accomplished.



**THREE WATER BALANCE MAPS OF EASTERN NORTH AMERICA.** By C. B. Thornthwaite, John R. Mather, and Douglas B. Carter. 47 pp. Illus. 1958. Washington, D. C.: Resources For the Future, Inc. \$2.

**T**HE need has long been recognized for an accurate method of determining water quantities associated with the hydrologic cycle. Water, as vapor, rises from the oceans, is carried inland by air currents, is precipitated over the land, and is returned to the oceans by streams. This is an oversimplification of the water cycle. With an increasing demand on our water resources, it becomes necessary to inventory these resources and to learn more about the hydrologic cycle; values of precipitation; evapotranspiration; groundwater recharge; and surface water runoff.

The authors of this publication have developed generalized maps covering eastern North America on (1) Mean Annual Potential Evapotranspiration; (2) Mean Annual Water Deficit; and, (3) Mean Annual Water Surplus. The water balance method used by the authors uses data which are relatively easy to obtain. Computations are based on values of precipitation; actual evapotranspiration; potential evapotranspiration; water surplus; soil moisture utilization; water deficit; and, soil moisture recharge.

Note:—The author is conservation aid, Soil Conservation Service, Wakefield, R. I.



CHANGE OF ADDRESS SHOULD INCLUDE ZONE, OLD ADDRESS, AND CODE NUMBER.

The generalized maps have definite technical limitations, as pointed out by the authors, but they should be useful in getting a good picture of the moisture relations over a large geographical area. The publication discusses in clear and simple language the relative importance of computing water balance information on a daily, monthly, average monthly, and average yearly basis.

The approach outlined in this publication could prove to be very useful to water resource planners, water users, conservationists, and others interested in the efficient use of water. Application of local climatic and soils conditions, along with an appropriate time, provides a means whereby water balance information is available to small areas or specific locations.

—W. G. SHANNON

**HYDROLOGY FOR ENGINEERS.** By Ray K. Linsley, Jr., Max A. Kohler, and Joseph L. H. Paulhus. 340 pp. Illus. 1958. New York: McGraw-Hill Book Co. \$8.

**T**HIS text is written in simple terms to provide the engineering student with a theoretical background in hydrology, and to point out the application of hydrology to engineering problems.

In many respects this text is similar to "Applied Hydrology", 1949, by the same authors. The simplicity of presentation, plus a listing of sources of hydrologic data and typical problems to point out the application of

methods presented, will make it a more valuable text to introduce the student to Hydrology.

Practicing engineers not familiar with recent technical publications in the field of Hydrology will also find some new methods and concepts not previously included in textbooks.

—H. O. OGROSKY

**LESS SWEETCLOVER SEED.**—The 1958 crop of sweetclover seed was estimated at about 29 million pounds. This is 4 percent less than 1957 and the smallest crop since 1943.

**MORE RED CLOVER SEED.**—The 1958 crop of red clover seed was estimated as being about 10 percent greater than the 1957 crop. Yet this crop is about 9 percent less than the 1947-56 average.

**HOW LONG WILL DRAIN TILE LAST?**—John S. Smith, SCS technician in Cherokee County, N. Y., says some tile installed near Geneva, N. Y. in 1835 was still giving good service a few years ago, when he inspected it.

**WATERSHED SHORT COURSE.**—The Abraham Baldwin Agricultural College at Tifton, Ga. and the SCS jointly sponsored a short course on watershed organization for community leaders in watersheds applying for Federal assistance under Public Law 566. Seventy-seven people registered for the first course.

